What Is Claimed Is:

1.   A system for monitoring a complex process over a transition phase from a first mode, said system comprising:

a database containing identifying data related to known modes and known transitions;

a measurement device providing current process data related to said complex process;

a comparator using said identifying data and said current process data so as to determine which one of said known modes and said known transitions that said complex process is currently within; and

a range checking component using stored data of said one of said known modes and said known transitions as determined by said comparator, and using said current process as data so as to signal when said complex process is outside of an acceptable range.

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2.    A system according to claim 1 wherein said transition phase includes at least one changing process variable.

5            3.    A system according to claim 1 wherein said mode includes all substantially constant variables.

4.    A system according to claim 1 wherein said complex process comprises a second mode after said 10 transition phase.

5.    A system according to claim 1 wherein said identifying data related to said known modes and said known transitions is based on historical data.

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6.    A system according to claim 1 wherein said identifying data related to said known transitions are based on theoretical data.

20            7.    A system according to claim 1 wherein said comparator is configurable to receive input from an

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operator to determine whether said complex process is currently within one of said known modes and said known transitions.

5          8.    A system according to claim 1 wherein each of said known modes and said known transitions is subdivided into enhanced states, and further wherein said database contains identifying data related to each of said enhanced states of said known modes and 10 said known transitions so as to determine which one of said enhanced states of said known modes and said known transitions that said complex process is currently within.

15         9.    A system according to claim 8 wherein each of said enhanced states is subdivided into atoms, and further wherein said database contains identifying data related to each of said atoms of said enhanced states of said known modes and said known transitions 20 so as to determine which one of said atoms of said enhanced states of said known modes and said known

transitions that said complex process is currently within.

10. A system according to claim 1 wherein said identifying data of said comparator comprises mapped data.

11. A system according to claim 10 wherein at least a portion of said mapped data relates to said known transitions.

12. A system according to claim 10 wherein at least a portion of said mapped data relates to known modes.

13. A system according to claim 10 wherein at least a portion of said mapped data relates to an individual subsection of said known transitions.

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14. A system according to claim 10 wherein at least a portion of said mapped data relates to an individual subsection of said known modes.

5      15. A method for monitoring a complex process over a transition phase from a first mode, said method comprising:

providing a database containing identifying data related to known modes and known transitions;

10     obtaining current process data related to said complex process;

comparing said current process data with said identifying data so as to determine which one of said known modes and said known transitions that said

15     complex process is currently within; and

comparing said current data with stored data of said one of said known modes and said known transitions as determined by said comparator so as to signal when said complex process is outside of an

20     acceptable range.

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16. A method for supervising a complex process involving a client, said method comprising:

identifying a state of said complex process, said state comprising one of at least one transition phase and at least one mode;

reporting said identified state comprising said one of at least one transition phase and at least one mode to said client; and

reconfiguring said client based on said identified state of state of said complex process.

17. A method for classifying a complex process into modes and transition phases, said method comprising:

identifying values of given variables within a subsection of said complex process;

determining the magnitude of variation of each of said values of said given variables over said subsection of said complex process; and

classifying said subsection into one of said modes and said transition phases based on said

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magnitude of variation of each of said values of said

given variables over said subsection of said complex

process.

18. A method according to claim 17 wherein a

section is classified in a mode when each of its

subsections are classified in modes.

19. A method according to claim 17 wherein a

section is classified in a transition when at least

one of its subsections is classified in a transition

phase.

20. A method of generating knowledge base for

monitoring a complex process over a transition, said

method comprising:

obtaining plant history data and plant hierarchy;

grouping plant tags into sections and

subsections;

generating a process trend and a wavelet

coefficient for each said plant tags;

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generating process trends for each tag in every

lower-level group;

identifying periods of constancy for each

variable in each lower-level group using said

5       generated process trends;

identifying modes for each lower-level group;

consolidating and characterizing modes for each

lower-level group;

consolidating and characterizing transitions;

10      generating an event list for each lower-level

group;

generating an event lookup table for higher-level

groups; and

generating said knowledge base.

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21.  A method for identifying a state of a

complex process, said state comprising one of at least

one transition phase and at least one mode, said

method comprising:

20      providing tagged sensor data from said complex

process;

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segregating said tagged sensor data into plant

sections and subsections of a plant hierarchy using a

knowledge base;

analyzing the range of variables of each of said

5   subsections using said knowledge base so as to

determine which one of a transition phase with at

least one of said variables outside of said

pre-determined range and a mode with all of said

variables within said pre-determined phase that said

10   subsection is currently within;

identifying a current mode for each of said

subsections in one of said modes based on values of

said variables and said knowledge base;

identifying current transition phases for each of

15   said subsections in one of said transition phases

using wavelet-based feature comparison for key

variables with said knowledge base; and

deducing events in higher level plant groups

using each of said current modes, current transitions,

20   and said knowledge base.

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22. A method for identifying a current
transition phase of a complex process, said method
comprising:

generating wavelet approximation coefficients for

5   variables in a subsection in said current transition
phase;

comparing said wavelet approximation coefficients
of said current transition phase with corresponding
wavelet coefficients for transitions available in a

10  knowledge base; and

identifying said current transition phase based
on said comparison of said wavelet approximation
coefficients of said current transition phase with
said corresponding wavelet coefficient for transitions

15  available in said knowledge base.


23. A method to track a complex process within
transition phase, said method comprising:

providing distinct features of process variables

20  of common operation data within a common transition
phase;

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measuring distinct features of process variables

of said complex process within said transition phase;

and

comparing said distinct features of said process

5       variables of said complex process within said

transition phase and said distinct features of said

process variables of said common operation data within

said common transition phase so as to track said

complex process.


24.   A method for determining an enhanced trend

for a series of one subset of distinct features of a

process variable, said method comprising:

obtaining stored information related to said

15      series of said one subset of said distinct features of

said process variable;

obtaining current information related to said one

subset of said distinct features of said process

variable; and

20      comparing said current information related to

said one subset of said distinct features of said

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process variable and said stored information related
to said series of said one subset of said distinct
features of said process variable to one another so as
to determine said enhanced trend for said series of

5   said one subset of distinct features of said process
variable.


25.   A method for tracking a trend of a process
variable against a stored trend as given in a
10  dictionary, said method comprising:

comparing said trend of said process variable to
a current dictionary atom and a subsequent dictionary
atom;

identifying one of said current dictionary atom
15  and said subsequent dictionary atom corresponding to
said trend of said process variable; and

broadcasting information related to current
transition phase of said identified current dictionary
atom to sections of a plant.

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26.  A method for monitoring a complex process during a transition phase, said method comprising:

measuring a real-time enhanced trend of process variables;

identifying a dictionary enhanced trend of said process variables;

comparing trends of each of said real-time enhanced trend and said dictionary enhanced trend to one another;

comparing process variable magnitudes of each of said real-time enhanced trend of said process variables and said dictionary enhanced trend to one another;

comparing trend durations of each of said real-time enhanced trend of said process variables and said dictionary enhanced trend to one another;

calculating a matching degree for each of said process variables from said trend comparison, said process variable magnitude comparison, and said trend duration comparison;

calculating a degree of fault of said complex

process as a function of degree of fault of individual

sensors; and

informing an operator of said matching degree and

5      said degree of fault.


27.   A system according to claim 1 wherein said

identifying data related to said known transitions are

based on experience-based data.

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